

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/324043329>

The Age of Artificial Intelligence (3): the future

Article · January 2018

CITATIONS

3

READS

4,154

1 author:



[Keith Darlington](#)

London South Bank University

26 PUBLICATIONS 203 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Explainable AI Systems [View project](#)

Start (<https://www.bbvaopenmind.com/en/>). > The Age of Artificial Intelligence (3): The Future

SCIENCE · RESEARCH (<https://www.bbvaopenmind.com/en/science/research/>)

26 January 2018

The Age of Artificial Intelligence (3): The Future

Machine learning ([https://www.bbvaopenmind.com/en/tag-search/?searchTagsOM=Machine learning](https://www.bbvaopenmind.com/en/tag-search/?searchTagsOM=Machine%20learning)) | Productivity (<https://www.bbvaopenmind.com/en/tag-search/?searchTagsOM=Productivity>) | Robotics (<https://www.bbvaopenmind.com/en/tag-search/?searchTagsOM=Robotics>)

Keith Darlington (<https://www.bbvaopenmind.com/en/authors/keith-darlington/>)
Retired university lecturer in AI

Estimated reading time

5'

During the last five years, the rise of AI has been truly astounding. From highly sophisticated robots and driverless cars, to a wide range of “under the bonnet” techniques that use AI, **the market in AI is predicted to explode**. According to a new report from market research firm Tractica [1], **it is likely to grow from \$643.7 million at the present time, to \$36 billion by 2025**. This represents a 57-fold increase over that time period. Yet, this is only the beginning. Many people associate AI with robotics, but the applications and usage of AI is becoming vast. In this paper, I will briefly examine how AI is likely to impact on our lives in the future.



Many people associate AI with robotics, but the application and use of AI is increasingly wider. In this article, we analyze the future of AI and how it may impact our lives. Image: via **Wikimedia Commons**

A LOOK AT THE PAST TO GUESS THE FUTURE OF AI

I have outlined in this paper what the age of AI is likely to look like in the future and some of the consequences. Before doing so, it is important to put the development of AI into some historical perspective. AI is quite a new technology – **barely 60 years since the term AI was first coined**. I have been involved in AI research and taught the subject at university for about 30 years. But when I started it was virtually unknown – very few had heard of AI. I was always fascinated with the idea of machine intelligence but never expected to see what is now coming in my lifetime. I had many interesting discussions with colleagues along the lines of **“Can a machine think?” or “Can a machine ever display human level intelligence?”**, and so on. But it all seemed a bit academic then because it was widely agreed in the AI community that machines exhibiting human level intelligence was, at best centuries away. Others thought that it could never happen. Many in the AI community now think very differently.

So what has changed? Firstly, **hardware continues to improve** according to Moore’s Law (<https://www.bbvaopenmind.com/en/this-revolution-will-be-exponential-by-law/>) . This assertion was made about 50 years ago by one of the founders of the INTEL Corporation, Gordon Moore. He noticed that the number of transistors on an integrated circuit was doubling every year causing processor power approximately to double ever 18 months. To put this into perspective, this has meant that the computer power on a smart phone today exceeds that of the total processing power that was used by NASA during the Apollo Moon Missions. Secondly, the software that is now used in AI has gone through a quantum leap improvement in recent years. The focus of the previous generation, or old AI, was to mimic thinking. As I stated in my OpenMind article [2], the old AI had successes but its major drawback was its difficulty in learning. The new AI uses neural networks that try to mimic the biological neurons in the brain. As I stated in my Openmind article [3] (<https://www.bbvaopenmind.com/en/the-age-of-artificial-intelligence-part-2-machine-learning/>) , the latest generation of these are producing stunning results in learning without supervision. As a very recent example, AlphaZero, the game-playing AI created by DeepMind (<https://www.theguardian.com/technology/deepmind>) , has beaten the world’s best chess-playing computer program, having taught itself how to play unsupervised in under four hours without access to any human empirical knowledge of the game whatsoever [4].



WHAT WILL THE AI BRING US IN THE FUTURE?

So what are the implications? In the short term – the next 5-15 years – AI and robotics is likely to transform the workplace, making huge numbers of human jobs redundant. **Robots don't get paid, don't get tired, and don't demand better working conditions.** This means that there are millions of robots likely to take the place of factory workers in the future. For example, Foxconn [5], a company that assembles Apple iPhone parts, is replacing 60,000 workers with robots. These are very different to the dumb robots that have been used in car plants to perform repetitive single task activities. They are more mobile, flexible, and capable of more general multiple tasking.



Image: **Robots Insider**

10 years of perspective in AI

They will also rapidly improve in the next decade. These changes will hit millions of workers very hard with some analysts forecasting **30% job losses in the UK alone over the next 15 years** [6]. Of course, there will be jobs created but it will still lead to massive disruption because businesses will always seek efficient ways of working. The huge sums of money now spent on AI investment and research makes this outcome inevitable – **politicians will come under much pressure to find ways to mitigate these effects before it happens.** One possible suggestion, according to some, is that AI is going to generate massive wealth, so the tax receipts could be used to create a “universal income” for all citizens of working age. This could be substantial if the returns on AI automation deliver. Another problem in the short term according to Ray Kurzweil, an AI guru at Google, is not so much a living wage for all, it is the enfeeblement precipitated from not having anything to do. **How will all these unemployed people spend their time?** (https://en.wikipedia.org/wiki/Ray_Kurzweil)

ubiquitous, performing all sorts of general tasks reliably. Human-AI relationships will develop as simulated personalities become more convincing and **intelligent devices communicate with us in natural language similar to conversing with humans.** There will inevitably, be many other examples of advanced AI that will become commonplace because machine intelligence algorithms will find uses in many applications. These algorithms are likely to be everywhere dominating our lives.

A “GIFTED” INTELLIGENCE

In the longer term, super intelligent AI (that is intelligence above human level) is probably, according to some experts, at least 30 years away. However, when it comes, we will have capabilities to solve problems beyond our own intelligence limits and could well provide answers to problems beyond us – such as discovering technically efficient ways of providing energy, solving other resource problems, such as water availability, and so on.



The AI could solve problems that currently means a challenge for the survival of the human specie and the planet Earth itself, such as climate change or drought. Image:

Pixabay

There are many other possible benefits likely to unfold in an age of machine super intelligence. AI systems that can rapidly acquire large amounts of specialized knowledge **will be well-suited to medical and educational applications.** Kurzweil [7], lists several of these in his future predictions. For example, we have already entered a cyborg (<https://www.bbvaopenmind.com/en/humans-moving-toward-a-cyborg-horizon/>) (human augmentation) age where silicon enhances our own biological limits. Prosthetic limbs, hands and legs, are now in widespread use that provide strength and dexterity similar to that what could be attained to having actual limbs. Some recipients say that they even feel the sensation of these limbs. But this is only the start. **Many people will want to enhance the limits of their biological bodies with silicon-based intelligence that can improve them physically and/or mentally [8].**

Another one of the likely consequences of the age of AI is “mind or brain uploading” – that **is mind copying to a computer.** This could take the form of scanning the brain and creating a copy of that persons mind. This is known as **“digital immortality”** and many of the billionaire Technology gurus, such as Elon Musk, are investigating ways of doing this now. The cost of “mind uploading” will be high because **the human brain contains over 100 billion neurons interconnected in thousands of ways.** Of course, it’s unlikely that human consciousness could ever be fully replicated by uploading from biological to electronic format because we constantly change through our lives as a result of daily experiences. But some of the essential human characteristics, such as **the sound of a person’s voice, their beliefs and values, even sense of humour, could not be captured when more progress is made in this field and the computing power is available.** Whatever the case, it seems certain that we will encounter huge changes in the next few decades.

References

1. <https://www.top500.org/news/market-for-artificial-intelligence-projected-to-hit-36-billion-by-2025/>
(<https://www.top500.org/news/market-for-artificial-intelligence-projected-to-hit-36-billion-by-2025/>)
2. <https://www.bbvaopenmind.com/en/the-emergence-of-the-age-of-ai/> (<https://www.bbvaopenmind.com/en/the-emergence-of-the-age-of-ai/>)
3. <https://www.bbvaopenmind.com/en/the-age-of-artificial-intelligence-part-2-machine-learning/>
(<https://www.bbvaopenmind.com/en/the-age-of-artificial-intelligence-part-2-machine-%20learning/>)
4. <https://www.theguardian.com/technology/2017/dec/07/alphazero-google-deepmind-ai-beats-champion-program-teaching-itself-to-play-four-hours> (<https://www.theguardian.com/technology/2017/dec/07/alphazero-google-deepmind-ai-beats-champion-program-teaching-itself-to-play-four-hours>)
5. <https://futurism.com/apple-manufacturer-foxconn-to-fully-replace-humans-with-robots/> (<https://futurism.com/apple-manufacturer-foxconn-to-fully-replace-humans-with-robots/>)
6. <https://www.theguardian.com/technology/2017/mar/24/millions-uk-workers-risk-replaced-robots-study-warns>
(<https://www.theguardian.com/technology/2017/mar/24/millions-uk-workers-risk-replaced-robots-study-warns>)
7. https://en.wikipedia.org/wiki/Predictions_made_by_Ray_Kurzweil
(https://en.wikipedia.org/wiki/Predictions_made_by_Ray_Kurzweil)
8. <https://futurism.com/six-of-todays-most-advanced-real-life-cyborgs/> (<https://futurism.com/six-of-todays-most-advanced-real-life-cyborgs/>)

Related publications

5 Occasions Where You Use Artificial Intelligence (Without Knowing It)

(<https://www.bbvaopenmind.com/en/technology/artificial-intelligence/five-times-you-use-artificial-intelligence-and-you-didn-t-know/>)

Alan Turing and the Dream of Artificial Intelligence (<https://www.bbvaopenmind.com/en/technology/artificial-intelligence/alan-turing-and-the-dream-of-artificial-intelligence/>)

Measuring Artificial Intelligence: the Turing Test (<https://www.bbvaopenmind.com/en/technology/artificial-intelligence/measuring-the-artificial-intelligence-the-turing-test/>)

The Future of Artificial Intelligence and Cybernetics (<https://www.bbvaopenmind.com/en/articles/the-future-of-artificial-intelligence-and-cybernetics/>)

Why IoT Needs AI (<https://www.bbvaopenmind.com/en/technology/digital-world/why-iot-needs-ai/>)

Do you want to stay up to date with our new publications?

Receive the OpenMind newsletter with all the latest contents published on our website

Find out more here

[BIOSCIENCE \(HTTPS://WWW.BBVAOPENMIND.COM/EN/SCIENCE/BIOSCIENCE/\)](https://www.bbvaopenmind.com/en/science/bioscience/) · [ENVIRONMENT \(HTTPS://WWW.BBVAOPENMIND.COM/EN/SCIENCE/ENVIRONMENT/\)](https://www.bbvaopenmind.com/en/science/environment/) · [LEADING FIGURES \(HTTPS://WWW.BBVAOPENMIND.COM/EN/SCIENCE/LEADING-FIGURES/\)](https://www.bbvaopenmind.com/en/science/leading-figures/) · [MATHEMATICS \(HTTPS://WWW.BBVAOPENMIND.COM/EN/SCIENCE/MATHEMATICS/\)](https://www.bbvaopenmind.com/en/science/mathematics/) · [PHYSICS \(HTTPS://WWW.BBVAOPENMIND.COM/EN/SCIENCE/PHYSICS/\)](https://www.bbvaopenmind.com/en/science/physics/) · [RESEARCH \(HTTPS://WWW.BBVAOPENMIND.COM/EN/SCIENCE/RESEARCH/\)](https://www.bbvaopenmind.com/en/science/research/) · [SCIENTIFIC INSIGHTS \(HTTPS://WWW.BBVAOPENMIND.COM/EN/SCIENCE/SCIENTIFIC-INSIGHTS/\)](https://www.bbvaopenmind.com/en/science/scientific-insights/)

More publications about Keith Darlington

[ARTIFICIAL INTELLIGENCE \(HTTPS://WWW.BBVAOPENMIND.COM/EN/TECHNOLOGY/ARTIFICIAL-INTELLIGENCE/\)](https://www.bbvaopenmind.com/en/technology/artificial-intelligence/)

[Can Existing Technologies Deliver Human-Level Intelligence? \(https://www.bbvaopenmind.com/en/technology/artificial-intelligence/can-existing-technologies-deliver-human-level-intelligence/\)](https://www.bbvaopenmind.com/en/technology/artificial-intelligence/can-existing-technologies-deliver-human-level-intelligence/)

[ROBOTICS \(HTTPS://WWW.BBVAOPENMIND.COM/EN/TECHNOLOGY/ROBOTICS/\)](https://www.bbvaopenmind.com/en/technology/robotics/)

[The age of collaborative robots - Cobots \(https://www.bbvaopenmind.com/en/technology/robotics/the-age-of-collaborative-robots-cobots/\)](https://www.bbvaopenmind.com/en/technology/robotics/the-age-of-collaborative-robots-cobots/)

[ARTIFICIAL INTELLIGENCE \(HTTPS://WWW.BBVAOPENMIND.COM/EN/TECHNOLOGY/ARTIFICIAL-INTELLIGENCE/\)](https://www.bbvaopenmind.com/en/technology/artificial-intelligence/)

[The Social Implications of Driverless Cars \(https://www.bbvaopenmind.com/en/technology/artificial-intelligence/the-social-implications-of-driverless-cars/\)](https://www.bbvaopenmind.com/en/technology/artificial-intelligence/the-social-implications-of-driverless-cars/)

Comments on this publication

Login to comment

Subscribe

Log in (https://www.bbvaopenmind.com/en/user-

(https://www.bbvaopenmind.com/en/login/register/)

[Next article \(https://www.bbvaopenmind.com/en/science/research/algorithms-that-help-save-the-planet/\)](https://www.bbvaopenmind.com/en/science/research/algorithms-that-help-save-the-planet/)

[RESEARCH \(HTTPS://WWW.BBVAOPENMIND.COM/EN/SCIENCE/RESEARCH/\)](https://www.bbvaopenmind.com/en/science/research/)

Ventana al Conocimiento (Knowledge Window) (<https://www.bbvaopenmind.com/en/authors/ventana-al-conocimiento/>)
(<https://www.bbvaopenmind.com/en/science/research/algorithms-that-help-save-the-planet/>)

Do you want to stay up to date with our new publications?

Receive the OpenMind newsletter with all the latest contents published on our website

[Find out more here](#)

OpenMind Books

[Towards a New Enlightenment: A Transcendent Decade](#)
(<https://www.bbvaopenmind.com/en/books/towards-a-new-enlightenment-a-transcendent-decade/>)

[View all books](#)
(<https://www.bbvaopenmind.com/en/books/>)

Newsletter

[Keep up to date with our newsletter](#)
(<https://www.bbvaopenmind.com/en/newsletter/>)

About OpenMind

[About us](#)
(<https://www.bbvaopenmind.com/en/about-us/>)

[Events gallery](#)
(<https://www.bbvaopenmind.com/en/events/>)

[Authors](#)
(<https://www.bbvaopenmind.com/en/authors/>)

[Contact Us](#)
(<https://www.bbvaopenmind.com/en/contact-us/>)

[FAQs](#)
(<https://www.bbvaopenmind.com/en/faqs/>)

Connect with us

[Facebook](#)
(<https://www.facebook.com/BBV>)

[Twitter](#)
(<https://twitter.com/bbvaopenmi>)

[YouTube](#)
(<https://www.youtube.com/user/>)

[LinkedIn](#)
(<https://www.linkedin.com/showc-openmind/>)

OpenMind © Copyright 2019

BBVA Group (<https://www.bbva.com/en/>)

[Legal Notice](https://www.bbvaopenmind.com/en/legal-notice/) (<https://www.bbvaopenmind.com/en/legal-notice/>)

[Cookies Policy](https://www.bbvaopenmind.com/en/cookies-policy/) (<https://www.bbvaopenmind.com/en/cookies-policy/>)

[Personal Data Protection Policy](https://www.bbvaopenmind.com/en/personal-data-protection-policy/) (<https://www.bbvaopenmind.com/en/personal-data-protection-policy/>)

